Enclosure – IIIB

DSE Allied courses in Mathematics offered to B.Sc. –Chemistry by Department of Mathematics

Semester – III			
19UCHDA301	**DSE Allied - 3: Mathematics -I**	**3 hrs/week**	**3 Credits**

Objectives:-

Upon completion of the course students will be able to

1. Understand geometrical concepts including Line, Circle, Area and Volume
2. Identify and interpret the relationship among co-ordinate systems including Polar, Spherical &Cylindrical Co-ordinates.
3. Analyse the functional relationship among variables including Trigonometric functions, Exponential function, Logarithmic function, and Complex variable.
4. Understand and utilize the fundamental concepts of calculus including limits and continuity and differentiation.
5. Calculate mean, median, mode, variance and standard deviation of given data.

Unit 1: Basic geometry **(7 hrs)**

- Line
- Circle
- Area
- Volume

Unit 2: Polar, spherical & cylindrical co-ordinates **(8 hrs)**

- Co-ordinate.
- Polar Co-ordinates in $R^{2.}$
- Distance between two points in polar Co-ordinates.
- Polar equations of a straight line.
- Polar equations of circle.
- Relation between Cartesian and Polar coordinates.
- Relation between Cartesian and Spherical coordinates.
- Relation between Cartesian and Cylindrical coordinates.

Unit 3: Elementary functions **(7 hrs)**

- Trigonometric functions
- Inverse trigonometric functions
- Trigonometric relations
- The exponential function
- The logarithmic function
- Complex variable & Complex conjugate

Unit 4: Differentiation **(7 hrs)**

- Basic concepts of limits and continuity.
- The process of differentiation
- Differentiation from first principles
- Differentiation by rule

Unit 5: Measures of central tendency: **(7 hrs)**

- Mean
- Median
- Mode
- Range, Standard deviation, Variance.

TEXT BOOKS: -

1. Prof. H. K. Dass, Applied Mathematics, CBS Publishers & Distributors, New Delhi.
2. Robert R. Stoll, Set Theory and Logic, Eurasia Publishing House Pvt. Ltd.

REFERENCE BOOKS:-

1. Erich Steiner,The Chemistry Maths Book, OXFORD University Press, Second Edition.
2. R. R. Singh, Mukul Bhatt, Numerical and Statistical methods, McGraw Hill Education (India) Private Limited, New Delhi.

Semester – III			
19UCHDA302	**DSE Allied Practical - 3: Mathematics-I Practical**	**3hrs/wk**	**1 Credits**

Objectives:-

Upon completion of the course students will be able to

1. Understand geometrical concepts including Line, Circle, area and Volume
2. Identify and interpret the relationship among co-ordinate systems including Polar, Spherical &Cylindrical co-ordinates.
3. Analyse the functional relationship among variables including Trigonometric functions, Exponential function, Logarithmic function.
4. Understand and utilize the fundamental concepts of Calculus including limits and continuity and differentiation.
5. Calculate inverse of matrix, variance and standard deviation of given data.

List of Practical

1. Plotting the graphs of Lines and other problems related to lines.
2. Problems based on coordinate system.
3. Problems based on Area & Volume.
4. Plotting the Graphs of Elementary functions including conics.
5. Problems based on Limit & Continuity.
6. Problems based on Differentiation.
7. Problems based on Mean.
8. Problem based on Median.
9. Problem based on Mode.
10. Problems based on Variance and standard deviation.

TEXT BOOKS: -

1. Prof. H. K. Dass, Applied Mathematics, CBS Publishers & Distributors, New Delhi.
2. Robert R. Stoll, Set Theory and Logic, Eurasia Publishing House Pvt. Ltd.

REFERENCE BOOKS:-

1. Erich Steiner, The Chemistry Maths Book,OXFORD University Press, Second Edition.

Semester – IV			
19UCHDA401	**DSE Allied - 4: Mathematics-II**	**3hrs/week**	**3Credits**

Objectives:-

Upon completion of the course students will be able to

1. Understand and implement the concepts of set theory and function in Chemistry.
2. Understand and utilize the concept of Vectors in Chemistry.
3. Calculate integration occurring in chemical calculation.
4. Understand and utilize the concept of Matrices.

Unit 1: Set theory and Functions **(7 hrs)**

- Basic definition of sets and its examples.
- Various operations on set.
- Vann Diagram.
- Applications of set theory.
- Definition of function and relation.
- Types of functions.

Unit 2: Vector Differentiation **(7 hrs)**

- Vector algebra
- The scalar (dot) product
- The vector (cross) product
- Curl, gradient, divergence

Unit 3: Integration **(8 hrs)**

- Concept of integration
- The indefinite integral
- The definite integral

Unit 4: Concept of a matrix **(7 hrs)**

- Introduction to matrices
- Different types of matrices.
- Algebraic operations on matrices including inverse.
- Row operations of matrices.
- Rank of a matrix by raw echelon form.

Unit 5: Eigen values and eigen vectors of a matrix **(7 hrs)**

- The characteristic equation of a matrix.
- Eigen values.
- Eigen vectors.
- Inverse of matrices.

TEXT BOOKS: -

1. Prof. H. K. Dass, Applied Mathematics, CBS Publishers & Distributors, New Delhi.
2. Shanti Narayana and P.K. Mittal, Textbook of Matrices, S.Chand and Company Ltd, 11^{th} Edition.

REFERENCE BOOKS:-

1. N. P. Bali, Solid Geometry, Laxmi Publications Ltd.
2. Oxford University, The Chemistry Maths Book, PAGES-718, Second Edition Erich.
3. Shanti Narayana and P.K. Mittal, Analytical Solid Geometry, S. Chand and Company Ltd.
4. R. S. Agarwal, Quantitative Apptitude, S. Chand and Company, New Delhi.

Semester – IV			
19UCHDA402	**DSE Allied Practical – 4: Mathematics -II**	**3hrs/wk**	**1 Credits**

Objectives:-

Upon completion of the course students will be able to

1. Draw graphs of mathematical function with chemical point of view.
2. Draw understand and derive necessary information from Vann Diagrams.
3. Understand and utilize the concept of Vectors in Chemistry.
4. Calculate integration occurring in chemical calculation.
5. Understand and utilize the concept of Matrices.

List of Practical

1. Plotting the graphs of exponential function.
2. Plotting the graphs of logarithmic function.
3. Plotting the graphs of Trigonometric function.
4. Draw the Vann Diagrams.
5. Examples based on curl, divergence and gradient.
6. Examples based on Indefinite integral.
7. Examples based on Definite integral.
8. Examples based on rank of a matrix.
9. Find eigen value and eigen vector of a matrix.
10. Find Inverse of a Matrix.

TEXT BOOKS: -

1. Prof. H. K. Dass, Applied Mathematics, CBS Publishers & Distributors, New Delhi.
2. Shanti Narayana and P. K. Mittal, Textbook of Matrices, S. Chand and Company Ltd, 11^{th} Edition.

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1. N. P. Bali, Solid Geometry, Laxmi Publications Ltd.
2. Oxford University, The Chemistry Maths Book, PAGES-718, Second Edition Erich.
3. Shanti Narayana and P.K. Mittal, Analytical Solid Geometry, S. Chand and Company Ltd.
4. R. S. Agarwal, Quantitative Apptitude, S. Chand and Company, New Delhi.